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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Kevin E. Spaulding et al

METHOD FOR REPRESENTING A
DIGITAL COLOR IMAGE USING A
SET OF PALETTE COLORS

Serial No. 09/900,565

Filed July 6, 2001

Commissioner for Patents
P.O. Box 4150
Alexandria, VA 22313-4150

Sir:

Group Art Unit 2672
Examiner Ryan R. Yang

N.E. Due
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be updated.

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JUN 04 2004

Technology Center 2600

ASSOCIATE POWER OF ATTORNEY

I hereby appoint **Patrick J. Finnan** Registration No. **39,189** of Edell, Shapiro, & Finnan LLC, 1901 Research Boulevard, Suite 400, Rockville, Maryland 20850-3164 as associate attorneys in the above-entitled application with full power to prosecute this application and to transact all business in the United States Patent and Trademark Office connected herewith.

Please address all written communications to **Pamela R. Crocker**, Patent Legal Staff, Eastman Kodak Company, Patent Legal Staff, Rochester, New York 14650-2201 and all telephone communications to **Raymond L. Owens** at **585-477-4653**.

Respectfully submitted,

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FACSIMILE TRANSMISSION

Date: July 12, 2004

To: USPTO

Attn: Examiner Ryan R. Yang

Facsimile Tel. No.: 703-746-6009

Number of Pages (including cover sheet) 13

From: Heather Morin

If any difficulties occur during transmission, please contact Amanda at (301) 424-3640.

Re: **U.S. Patent Application Serial No. 09/900,565**
Attached is a copy of the date-stamped filing receipt and the
Amendment filed on June 1, 2004

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Appl. No. : 09/900,565
Applicant : Kevin E. Spaulding, et al.
Filed : July 6, 2001
TC/A.U. : 2672
Examiner : YANG, Ryan R.
Confirmation No. : 4100
Docket No. : 0505.0044C
Customer No. : 27896
Title : Method for Representing a Digital Color Image
Using a Set of Palette Colors

MAIL STOP AF
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450



Sir:

The stamp of the U.S. Patent and Trademark Office placed hereon will indicate the date of receipt of the following:

Transmittal;

Amendment (11 pages);

* Associate Power of Attorney *

Petition for Extension of Time; and

Check No. 7750 in the amount of \$110 for the extension fee.

Hand-Delivered: 6/11/04

AMENDMENT OF SPAULDING, ET AL.
APPLICATION NO. 09/900,565
ATTORNEY DOCKET NO.: 0505.0044C

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

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Mail Stop AF
Commissioner for Patents
P.O. Box 1450
Alexandria, VA. 22313-1450

Sir:

Amendment under 37 CFR 1.116

In response to the Office Action mailed February 25, 2004, please amend the above-identified application as follows, without prejudice.

Amendments to the Claims are reflected in the listing of claims which begins on page 2 of this paper.

Remarks/Arguments begin on page 6 of this paper.

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Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application.

Listing of Claims:

1. cancelled.
2. (currently amended) The method of ~~claim 1~~ claim 19, wherein the distribution of pre-defined important colors includes a distribution of skin-tone colors.
3. (currently amended) The method of ~~claim 1~~ claim 19, wherein the distribution of pre-defined important colors includes a distribution of neutral colors.
4. (currently amended) The method of ~~claim 1~~ claim 19, wherein the distribution of pre-defined important colors includes a distribution of sky colors.
5. (currently amended) The method of ~~claim 1~~ claim 19, wherein determining the supplemented distribution of colors is accomplished by appending additional pixels to the input digital color image to form an enlarged input digital color image, where the color of the additional pixels is distributed according to the distribution of pre-defined important colors, and then determining the distribution of colors in the enlarged input digital color image.
6. (currently amended) The method of ~~claim 1~~ claim 19, wherein the set of palette colors is determined using a sequential scalar quantization algorithm.
7. (currently amended) The method of claim 6, wherein the sequential scalar quantization algorithm includes the steps of:
 - i) sequentially partitioning the colors of the supplemented distribution of colors into a set of color space regions; and
 - ii) determining the set of palette colors by selecting an output color for each color space region in the set of color space regions.

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8. (currently amended) The method of claim 7, further ~~including~~ comprising:
determining the color value for each pixel of the output digital color image by
identifying the palette color corresponding to the color space region containing the input
color for the corresponding pixel of the input digital color image.
9. (currently amended) The method of ~~claim 1~~ claim 19, wherein the set of
palette colors is determined using a vector quantization algorithm.
10. (currently amended) The method of ~~claim 1~~ claim 19, wherein the output
digital color image is formed by assigning each color in the input digital color image to the
color in the set of palette colors having the smallest color difference relative to the color of
the input digital color image.
11. (currently amended) The method of ~~claim 1~~ claim 19, wherein ~~step d)~~ step f)
includes the use of a multi-level halftoning technique to assign each color in the input digital
color image to one of the colors in the set of palette colors in such a way so as to
approximately preserve the local mean color value.
12. (currently amended) The method of claim 11, wherein the multi-level
halftoning technique is an error diffusion technique that distributes the quantization errors
introduced when processing an input pixel to nearby input pixels that have not yet been
processed.
13. (currently amended) The method of ~~claim 1~~ claim 19, wherein the
distribution of pre-defined important colors is only used to supplement the distribution of
colors in the input digital color image in color regions where the input digital color image
contains a significant number of pixels.
14. cancelled.

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15. (currently amended) The method of ~~claim 14~~ claim 19, ~~where~~ wherein the additional pixels are provided in the form of a predetermined target image.

16-18. cancelled.

19. (new) A method for converting an input digital color image having a set of possible input colors to an output digital color image having a set of palette colors, the number of palette colors being less than the number of possible input colors, wherein the set of palette colors is determined based on the distribution of colors in the input digital image supplemented by a distribution of pre-defined important colors, comprising:

- a) determining a distribution of input colors using each pixel in the input digital color image;
- b) providing a pre-determined target image of important colors;
- c) collecting additional pixels from the target image;
- d) adding the collected additional pixels to the distribution of input colors to determine a supplemented distribution of colors;
- e) determining a set of palette colors to be used in the formation of an output digital color image in response to the supplemented distribution of colors; and
- f) forming the output digital color image by assigning each color in the input digital color image to one of the colors in the set of palette colors.

20. (new) A computer storage medium having instructions stored therein for causing the computer to perform a method for converting an input digital color image having a set of possible input colors to an output digital color image having a set of palette colors, the number of palette colors being less than the number of possible input colors, wherein the set

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of palette colors is determined based on the distribution of colors in the input digital image supplemented by a distribution of pre-defined important colors including

- a) determining a distribution of input colors using each pixel in the input digital color image;
- b) providing a pre-determined target image of important colors;
- c) collecting additional pixels from the target image;
- d) adding the collected additional pixels to the distribution of input colors to determine a supplemented distribution of colors;
- e) determining a set of palette colors to be used in the formation of an output digital color image in response to the supplemented distribution of colors; and
- f) forming the output digital color image by assigning each color in the input digital color image to one of the colors in the set of palette colors.

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REMARKS

Favorable reconsideration in view of the above amendments and the following remarks is respectfully requested. New claims 19 and 20 have been added, claims 2-13 and 15 have been amended, and claims 1, 14, and 16-18 have been cancelled without prejudice or disclaimer. Applicants submit that no new matter has been added, and notice to that effect is solicited. Applicants further submit that the claims, as now presented, more clearly claim the subject matter of the instant application. Upon entry of this amendment, claims 2-13, 15, 19, and 20 are pending of which claims 19 and 20 are independent.

The Examiner is thanked for conducting a personal interview with Applicant's representative on May 5, 2004. The following serves as an interview summary in satisfaction of 37 CFR 1.133 and MPEP 713.04.

- (A) No exhibits were shown or demonstrations conducted.
- (B) All of the claims were discussed, in particular, independent claims 1 and 14.
- (C) The following reference was discussed: Balasubramanian.
- (D) Limitations of the claims were discussed generally, and it was proposed to consider clarifying language in the claims.
- (E) The principal thrust of Applicants' argument is that the cited references fail to describe or suggest the claimed subject matter.
- (F) No other pertinent matters were discussed in detail.
- (G) Applicants agreed to consider clarifying language in the independent claims.

In accordance with the foregoing, Applicants have added new claims 19 and 20, and amended claims 2-13 and 15, which Applicants submit more clearly presents the subject matter of the instant application.

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Claims 1, 14, and 17 were rejected under 35 USC 112, first paragraph, as failing to comply with the written description requirement. Claims 2-13, 15, 16, and 18 were rejected for depending from rejected claims.

Claims 1, 14, and 16-18 have been cancelled as indicated above. Applicants submit that this rejection is moot as to these claims. Insofar as the rejection of claims 2-13 and 15 remains, Applicants submit that the specification describes the objected to term.

The Examiner does not believe that the specification mentions that the regions of important colors are pre-defined. Applicants respectfully submit that the specification, as originally filed, does describe this. In particular, for example, on page 8 of the specification, sets of important colors that can be used with the subject matter of the instant application are described. Important colors are described as "colors that are of high importance to a human observer." (lines 7-8). Further, "[s]kin-tone colors are an example of colors that might be included in the set of important colors," (lines 10-11) and "[i]n this case, the distribution of important colors should generally reflect the expected variations in the skin-tone colors." (lines 16-17). Additionally, the specification describes that "[o]ther colors that might be included in the distribution of important colors [] would be neutral colors and sky colors." (lines 17-19). Therefore, Applicants respectfully submit that the specification, as originally filed, provides a description of the regions of important colors being predefined, and thus, complies with the written description requirement.

Accordingly, withdrawal of these rejections is respectfully requested.

Claims 14 and 15 were rejected under 35 USC 102 (b) as being anticipated by Balasubramanian et al (Journal of Technology, 1991). This rejection is respectfully traversed.

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Claim 14 has been cancelled as indicated above. As such this rejection is moot as to claim 14. Insofar as the rejection of claim 15 remains, Applicants submit that Balasubramanian fails to describe or suggest the subject matter of the instant claim. Amended claim 15 depends from new independent claim 19.

Independent claim 19 recites a method for converting an input digital color image having a set of possible input colors to an output digital color image having a set of palette colors. The number of palette colors are less than the number of possible input colors. The set of palette colors is determined based on the distribution of colors in the input digital image supplemented by a distribution of pre-defined important colors. The method includes a) determining a distribution of input colors using each pixel in the input digital color image; b) providing a pre-determined target image of important colors; c) collecting additional pixels from the target image; d) adding the collected additional pixels to the distribution of input colors to determine a supplemented distribution of colors; e) determining a set of palette colors to be used in the formation of an output digital color image in response to the supplemented distribution of colors; and f) forming the output digital color image by assigning each color in the input digital color image to one of the colors in the set of palette colors.

Balasubramanian relates to selecting colors for a limited image palette in which the initial number of image colors are reduced and there is pairwise merging of nearest neighbor clusters. This is not, however, describe or suggest the claimed method. Balasubramanian does not collect additional pixels from the target image and add the collected additional pixels to the distribution of input colors to determine a supplemented distribution of colors, as claimed. Therefore, Balasubramanian does not describe or suggest the invention of claim 15. Accordingly, withdrawal of this rejection is respectfully requested.

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Claims 1-5, 9, 10, 13, 16, and 18 were rejected under 35 USC 103(a) as being unpatentable over Balasubramanian et al in view of Czako (6,229,523). This rejection is respectfully traversed.

Claims 1, 16, and 18 have been cancelled as indicated above. As such this rejection is moot as to claims 1, 16, and 18. Insofar as the rejection of claims 2-5, 9, 10, and 13 remains, Applicants submit that Balasubramanian fails to describe or suggest the subject matter of the instant claims, and that Czako is unable to overcome the at least the noted deficiencies. Claims 2-5, 9, 10, and 13 depend from new independent claim 19.

As pointed out above, Balasubramanian relates to selecting colors for a limited image palette. This is not, however, describe or suggest the claimed method. Balasubramanian lacks at least "determining a set of palette colors to be used in the formation of an output digital color image in response to the supplemented distribution of colors," as noted by the Examiner in the Action at page 5, paragraph 11. Further, Balasubramanian does not collect additional pixels from the target image and add the collected additional pixels to the distribution of input colors to determine a supplemented distribution of colors, as claimed in independent claim 19.

Czako relates to digital versatile disc playback system with efficient modification of subpicture data. Czako is unable to overcome at least the noted deficiencies in Balasubramanian. Therefore, even Balasubramanian in combination with Czako fails to describe or suggest the claimed subject matter.

Accordingly, withdrawal of this rejection is respectfully requested.

Claims 6-8 were rejected under 35 USC 103(a) as being unpatentable over Balasubramanian et al in view of Balasubramanian et al (5,432,893). Claims 11 and 12 were

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rejected under 35 USC 103(a) as being unpatentable over Balasubramanian et al in view of Gentile et al (Journal of Optical Society of America, 1990).

These rejections are respectfully traversed.

Claims 6-8 depend from independent claim 19, which is not described or suggested by Balasubramanian alone. As pointed out above, Balasubramanian lacks at least "determining a set of palette colors to be used in the formation of an output digital color image in response to the supplemented distribution of colors," as noted by the Examiner in the Action, collecting additional pixels from the target image, and adding the collected additional pixels to the distribution of input colors to determine a supplemented distribution of colors.

Balasubramanian '893 is unable to overcome at least the noted deficiencies in Balasubramanian. Balasubramanian '893 relates to sequential scalar quantization of a digital color image using mean squared error-minimizing quantizer density function. Balasubramanian '893 also lacks at least these features. Therefore, even Balasubramanian in combination with Balasubramanian '893 fails to describe or suggest the inventions of claims 6-8.

Similarly, Gentile is unable to overcome at least the noted deficiencies in Balasubramanian. Gentile relates to selecting a set of output colors in alternate color spaces chosen on a perceptual basis for digital devices for display or printing of color images. Gentile also at least lacks "determining a set of palette colors to be used in the formation of an output digital color image in response to the supplemented distribution of colors," as noted by the Examiner in the Action, collecting additional pixels from the target image, and adding the collected additional pixels to the distribution of input colors to determine a

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supplemented distribution of colors. Therefore, Balasubramanian in combination with Gentile also fails to describe or suggest the inventions of claims 11 and 12.

Accordingly, withdrawal of these rejections is respectfully requested.

As to the new and amended claims, Applicants submit that these claims are allowable over the cited art of record. As more clearly presented, independent claim 19 describes that additional pixels can be provided in the form of a pre-determined target image (see specification, page 9).

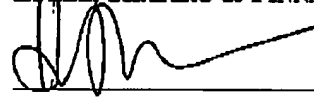
Applicants submit that the pending claims are in condition for allowance, and formal notice of such is solicited. If the Examiner has any questions, he is respectfully requested to contact the undersigned at the number listed below.

Dated: 6/1/04

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By:

Respectfully submitted by
EDELL, SHAPIRO & FINNAN, LLC



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